REMARKS/ARGUMENTS

The action by the Examiner of this application, together with the cited references, has been given careful consideration. Following such consideration, claims 1-16 have been canceled and claims 17-28 have been added to define more clearly the patentable invention applicant believes is disclosed herein. It is respectfully requested that the Examiner reconsider the claims in their present form, together with the following comments, and allow the application.

The present invention provides a method by which vaporized hydrogen peroxide and ozone are supplied to a region to effect a deactivation therein. The method of the present invention efficiently delivers hydrogen peroxide and ozone to the region using a closed loop, whereby the concentration of the vaporized hydrogen peroxide and ozone can be precisely regulated. The ozone generated in accordance with the present invention is produced under dry conditions that promote the production of ozone. The ozone generated under dry conditions is then used in humid conditions to effect inactivation of bio-contamination. The humid conditions promote the bleaching qualities of the ozone. The present invention also provides a method by which both hydrogen peroxide and ozone can be conveniently and efficiently delivered to a region by a carrier gas.

The Examiner has rejected claims 10-11 and 13-15 as being obvious in view of the combined teachings of Pai et al. (US 6,156,267) and Childers (WO97/47331). In addition, the Examiner has rejected claim 12 as being obvious in view of the combined teachings of Pai et al., Childers and Manning (US 6,022,456). The Examiner argues that Pai et al. teaches combining conventional sterilants, such vaporized hydrogen peroxide and ozone, "by providing sensors for measuring the concentration of each sterilant." However, the Examiner acknowledges that Pai et al. does not specifically teach a sterilization system that includes a recirculating closed loop. Accordingly, the Examiner relies upon Childers for this feature. In particular, the Examiner argues that Childers discloses recirculation of vaporized hydrogen peroxide in combination with a carrier gas through a closed loop conduit in communication with a sealed chamber.

Claims 1-16 of the present application have now been cancelled, and replaced with newly added claims 17-28. Independent claims 17 defines a method for deactivation using at least one vaporous or gaseous chemical that includes the steps of:

> ***circulating a gas through a closed loop system*** comprised of conduit and a region…;
>
> ***generating ozone gas in the conduit***, wherein said ozone gas is generated by an ozone generator disposed within the conduit, said ozone generator producing the ozone gas from the gas circulating through the conduit;
>
> ***removing moisture from the gas circulating in the conduit in advance of generating the ozone gas***, wherein said moisture is removed by a drying means disposed in the conduit upstream of the ozone generator;
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> ***introducing vaporized hydrogen peroxide into said conduit***, said vaporized hydrogen peroxide produced by a vaporizer disposed within the conduit downstream of the ozone generator; and
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> destroying vaporized hydrogen peroxide removed from the region through said outlet, wherein said vaporized hydrogen peroxide is destroyed by a destroyer disposed in the conduit.

With respect to claim 17, it is respectfully submitted that none of the cited references, taken individually or in combination, anticipates or renders obvious the claimed method for a deactivation, wherein ozone gas is generated in a conduit of a closed loop system, vaporized hydrogen peroxide is introduced into the same conduit downstream of the ozone generator that generates the ozone gas, and moisture is removed from the gas circulating in the conduit in advance of generating the ozone.

Pai et al. disclose a system and method for real-time monitoring and control of anti-microbial cycle parameters within a load-simulation device 6. The system and method simulate the same conditions as those within an acceptable standard challenge load to be sterilized. Pai et al. provide no teaching with respect to circulating ozone gas and vaporized hydrogen peroxide in a ***closed loop system***. Furthermore, Pai et al. provide no teaching with respect to ***removing moisture*** from gas circulating in a conduit of a closed loop system, in advance of generating ozone gas using the circulating gas.

The Examiner relies upon Childers for teaching recirculation of vaporized hydrogen peroxide in combination with a carrier gas through a closed loop conduit. The Examiner also relies upon Childers for disclosing "partially and selectively drying" of the carrier gas in response to sterilization parameters.

A close examination of Childers reveals that Childers' system and method "only partially and selectively" dries the carrier gas in response to system parameters (i.e., chamber temperature, relative humidity, and vapor concentration) in order to maintain a predetermined percent of sterilant vapor saturation in the sterilization chamber. In Childers' method, "the water vapor concentration of the carrier gas entering the chamber may be higher than was previously obtained or desired." Referring to page 9, lines 17 *et seq.* of Childers, the following is disclosed (emphasis added):

> The adjustable drying unit 24 **serves selectively to remove moisture from the carrier gas flow** entering the chamber. The drying unit preferably comprises a variable valve 26 having a first flow path A-B and a second flow path B-C, and a regenerative air dryer 28 having an inlet port 30 and an outlet port 32. The air dryer 28 is positioned downstream of the variable valve 26. A first fluid flow line 34 connects the first flow path to the dryer inlet port 30, while **a second fluid flow line 36 bypasses the dryer 28** and connects to the conduit circuit downstream of the drying unit. By varying the amount of flow through the first and second valve flow paths, a **selected portion of the carrier gas flow can be routed to bypass the dryer 28**. Alternately, a rate of drying, e.g., condensing of water vapor, by the dryer 28 can be adjusted directly. In this way, the humidity of the carrier gas can be regulated or adjusted (i.e., the carrier gas can be selectively dried) to **maintain a predetermined percent saturation of sterilant vapor in the chamber** as the sterilization cycle proceeds.

Childers provides a bypass line 36 to allow a portion of the carrier gas to bypass dryer 28, thereby maintaining the moisture in the bypassed carrier gas. In contrast, all of the gas circulating through the applicant's closed loop system has moisture removed therefrom prior to ozone gas generation. Thus, Childers teaches away from the claimed invention by providing means (i.e., bypass line 36) to maintain a level of moisture within the carrier gas, rather than to subject all of the carrier gas to moisture removal.

Moreover, Childers does not provide any teaching to remove moisture prior to an ozone generating process. As indicated above, the present invention removes moisture from the circulating gas before ozone generation in order to promote the production of ozone. After ozone has been produced it is used in humid conditions that promote the bleaching qualities of the ozone. It should be noted that some humidity is produced when the aqueous solution of hydrogen peroxide is vaporized by the vaporizer.

The claimed invention allows sequential or simultaneous application of ozone and vaporized hydrogen peroxide in a closed loop system to inactivate bio-contamination. Drying the circulating gas prior to producing ozone enhances the production of the ozone by the ozone generator. A vaporizer located in the same closed loop system as the ozone generator produces vaporized hydrogen peroxide that breaks down into water and oxygen, thereby increasing the humidity within a treatment region. The humidity within the treatment region provides conditions that promote the bleaching qualities of the ozone. Therefore, it is respectfully submitted that the combination of a dryer, an ozone generator and a vaporizer within a closed loop system provides unexpected and superior results as compared to a closed loop system that has only one or two of these components. The dryer enhances operation of the ozone generator, while the vaporized hydrogen peroxide produced by the vaporizer enhances the effectiveness of the ozone produced by the ozone generator.

Manning discloses an apparatus and method for generating ozone, wherein a recirculating loop method is used for producing and/or using ozone. However, Manning does not provide for the deficiencies of the references discussed above.

In view of the foregoing comments, it is respectfully submitted that the cited references, taken individually or in combination, fail to anticipate or render obvious the applicant's invention as set forth in the present claims.

Claims 18-28 depend from claim 17. Thus, it is respectfully submitted that these claims are likewise patentable over the cited references for at least the reasons discussed above in connection with claim 17.

In view of the foregoing, it is respectfully submitted that the present application is now in proper condition for allowance. If the Examiner believes there are any further matters

that need to be discussed in order to expedite the prosecution of the present application, the Examiner is invited to contact the undersigned.

If there are any fees necessitated by the foregoing communication, please charge such fees to our Deposit Account No. 50-0537, referencing our Docket No. ST8613US.

Respectfully submitted,

Date: May 18, 2007

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